



wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 29, 2026 – 04:14 PM JST

PDB ID : 9M53 / pdb_00009m53
Title : Crystal structure of 1L-myo-inositol 1-phosphate synthase 1 from *Oryza sativa*
Authors : Akabane, T.; Yota, A.; Katoh, E.; Hirotsu, N.
Deposited on : 2025-03-05
Resolution : 1.79 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 2.0
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.47

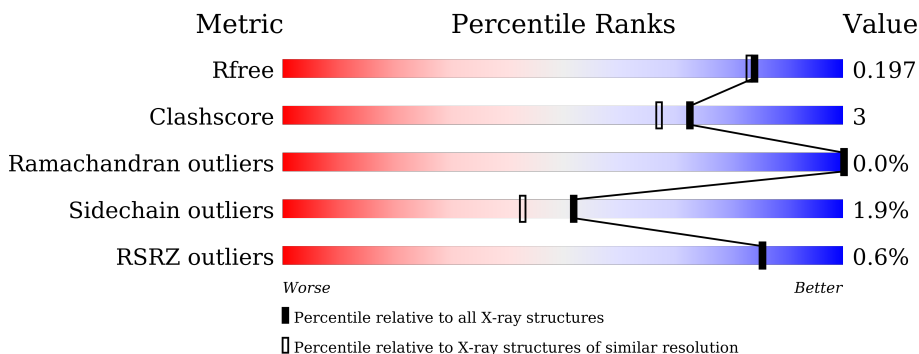
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.79 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	7108 (1.80-1.80)
Clashscore	180529	8162 (1.80-1.80)
Ramachandran outliers	177936	8077 (1.80-1.80)
Sidechain outliers	177891	8076 (1.80-1.80)
RSRZ outliers	164620	7108 (1.80-1.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	516	% 90% 8% ..
1	B	516	89% 8% ..
1	C	516	% 90% 7% ..
1	D	516	% 89% 8% ..

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 17695 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Inositol-3-phosphate synthase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	510	Total	C	N	O	S	0	0	0
			3949	2501	664	761	23			
1	B	504	Total	C	N	O	S	0	0	0
			3904	2477	653	751	23			
1	C	505	Total	C	N	O	S	0	0	0
			3916	2483	657	753	23			
1	D	506	Total	C	N	O	S	0	0	0
			3917	2483	657	754	23			

There are 24 discrepancies between the modelled and reference sequences:

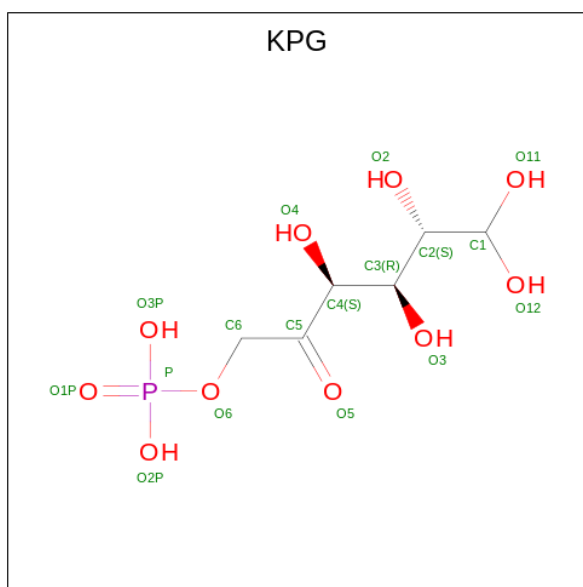
Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	GLY	-	expression tag	UNP O64437
A	-4	SER	-	expression tag	UNP O64437
A	-3	GLY	-	expression tag	UNP O64437
A	-2	MET	-	expression tag	UNP O64437
A	-1	LYS	-	expression tag	UNP O64437
A	0	GLU	-	expression tag	UNP O64437
B	-5	GLY	-	expression tag	UNP O64437
B	-4	SER	-	expression tag	UNP O64437
B	-3	GLY	-	expression tag	UNP O64437
B	-2	MET	-	expression tag	UNP O64437
B	-1	LYS	-	expression tag	UNP O64437
B	0	GLU	-	expression tag	UNP O64437
C	-5	GLY	-	expression tag	UNP O64437
C	-4	SER	-	expression tag	UNP O64437
C	-3	GLY	-	expression tag	UNP O64437
C	-2	MET	-	expression tag	UNP O64437
C	-1	LYS	-	expression tag	UNP O64437
C	0	GLU	-	expression tag	UNP O64437
D	-5	GLY	-	expression tag	UNP O64437
D	-4	SER	-	expression tag	UNP O64437
D	-3	GLY	-	expression tag	UNP O64437

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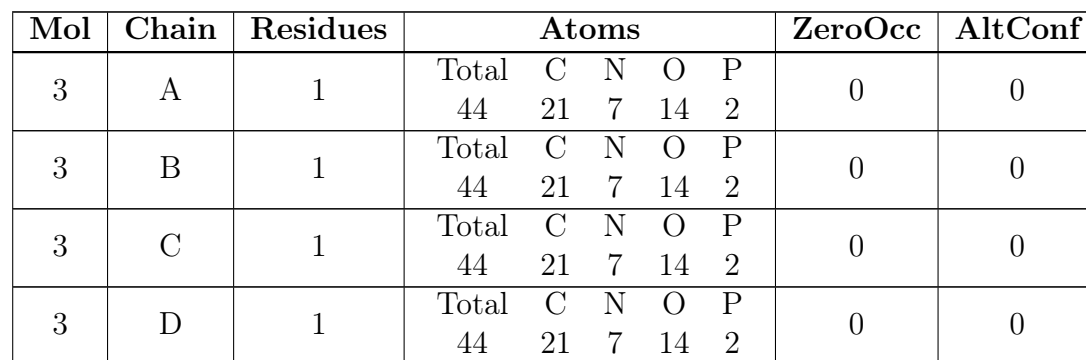
Chain	Residue	Modelled	Actual	Comment	Reference
D	-2	MET	-	expression tag	UNP O64437
D	-1	LYS	-	expression tag	UNP O64437
D	0	GLU	-	expression tag	UNP O64437

- Molecule 2 is [(3S,4R,5S)-3,4,5,6,6-pentahydroxy-2-oxo-hexyl] dihydrogen phosphate (CCD ID: KPG) (formula: C₆H₁₃O₁₀P).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	P	0	0
			17	6	10	1		
2	B	1	Total	C	O	P	0	0
			17	6	10	1		
2	C	1	Total	C	O	P	0	0
			17	6	10	1		
2	D	1	Total	C	O	P	0	0
			17	6	10	1		

- Molecule 3 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (CCD ID: NAI) (formula: C₂₁H₂₉N₇O₁₄P₂).



- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $\text{C}_2\text{H}_6\text{O}_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	C	1	Total C O 4 2 2	0	0
4	C	1	Total C O 4 2 2	0	0
4	C	1	Total C O 4 2 2	0	0
4	C	1	Total C O 4 2 2	0	0
4	C	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	D	1	Total	C	O	0	0
			4	2	2		
4	D	1	Total	C	O	0	0
			4	2	2		
4	D	1	Total	C	O	0	0
			4	2	2		
4	D	1	Total	C	O	0	0
			4	2	2		

- Molecule 5 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	K	0	0
			1	1		
5	B	1	Total	K	0	0
			1	1		
5	C	1	Total	K	0	0
			1	1		
5	D	1	Total	K	0	0
			1	1		

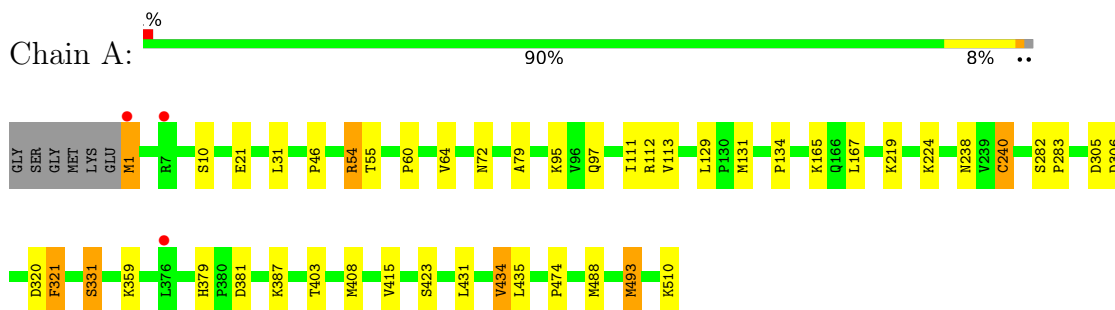
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	430	Total	O	0	0
			430	430		
6	B	436	Total	O	0	0
			436	436		
6	C	418	Total	O	0	0
			418	418		
6	D	373	Total	O	0	0
			373	373		

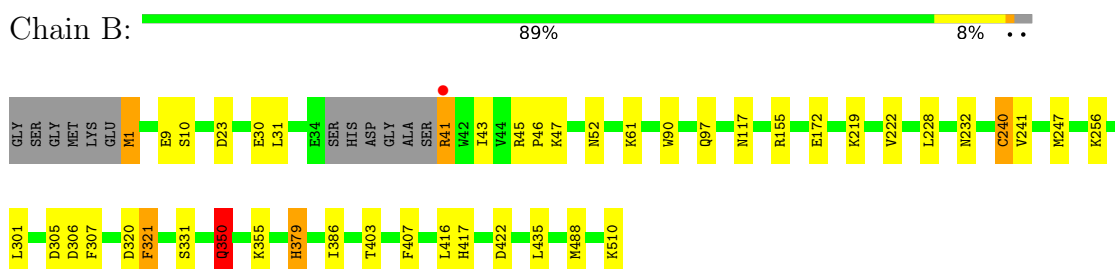
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

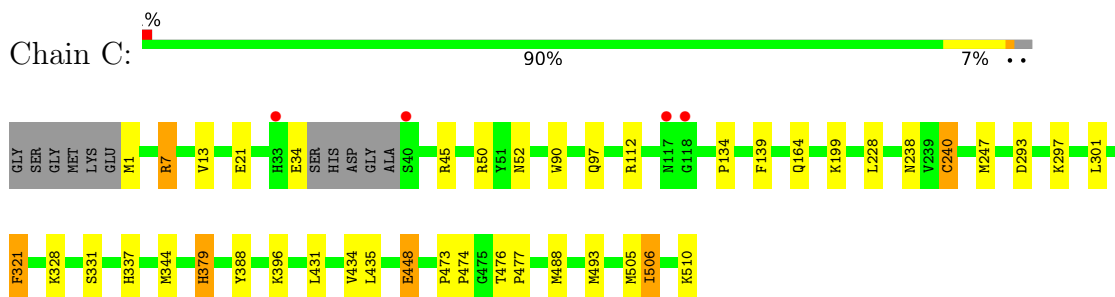
- Molecule 1: Inositol-3-phosphate synthase 1



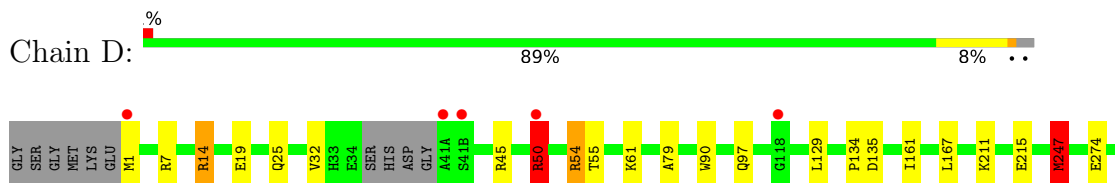
- Molecule 1: Inositol-3-phosphate synthase 1



- Molecule 1: Inositol-3-phosphate synthase 1



- Molecule 1: Inositol-3-phosphate synthase 1



S282	P283	D293	I296	K297	L301	F321	Q350	K355	H379	I386	K396	G409	D422	L431	L435	K446	E451	K452	P458	P473	P474	M488	M493	K510
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4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	70.30Å 137.08Å 217.97Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.45 – 1.79 47.45 – 1.79	Depositor EDS
% Data completeness (in resolution range)	100.0 (47.45-1.79) 100.0 (47.45-1.79)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.29 (at 1.79Å)	Xtriage
Refinement program	REFMAC 5.8.0430	Depositor
R, R_{free}	0.148 , 0.188 0.161 , 0.197	Depositor DCC
R_{free} test set	10011 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	12.0	Xtriage
Anisotropy	0.058	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 37.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	17695	wwPDB-VP
Average B, all atoms (Å ²)	14.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.04% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: KPG, K, EDO, NAI

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z > 5$	RMSZ	# $ Z > 5$
1	A	0.94	2/4026 (0.0%)	1.28	14/5463 (0.3%)
1	B	0.93	2/3979 (0.1%)	1.27	22/5399 (0.4%)
1	C	0.93	3/3991 (0.1%)	1.30	12/5414 (0.2%)
1	D	0.90	1/3992 (0.0%)	1.29	14/5417 (0.3%)
All	All	0.93	8/15988 (0.1%)	1.28	62/21693 (0.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1
1	D	0	3
All	All	0	4

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	379	HIS	CE1-NE2	8.21	1.40	1.32
1	A	510	LYS	C-O	7.47	1.38	1.23
1	B	510	LYS	C-O	7.17	1.37	1.23
1	C	510	LYS	C-O	5.86	1.35	1.23
1	C	379	HIS	CE1-NE2	5.80	1.38	1.32

The worst 5 of 62 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	510	LYS	CA-C-O	-12.25	99.98	120.80
1	D	510	LYS	CA-C-O	-11.48	101.28	120.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	247	MET	CG-SD-CE	-11.46	75.70	100.90
1	C	493	MET	CG-SD-CE	11.17	125.47	100.90
1	A	1	MET	CG-SD-CE	10.92	124.93	100.90

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	50	ARG	Sidechain
1	D	14	ARG	Sidechain
1	D	50	ARG	Sidechain
1	D	54	ARG	Sidechain

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3949	0	3952	25	0
1	B	3904	0	3911	19	0
1	C	3916	0	3927	24	0
1	D	3917	0	3921	23	0
2	A	17	0	11	5	0
2	B	17	0	10	4	0
2	C	17	0	11	4	0
2	D	17	0	11	4	0
3	A	44	0	27	1	0
3	B	44	0	27	2	0
3	C	44	0	27	0	0
3	D	44	0	27	0	0
4	A	16	0	24	1	0
4	B	44	0	66	2	0
4	C	20	0	28	1	0
4	D	24	0	36	1	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	430	0	0	4	1
6	B	436	0	0	1	2
6	C	418	0	0	7	2
6	D	373	0	0	7	1
All	All	17695	0	16016	100	3

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

The worst 5 of 100 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:409:GLY:HA2	6:D:702:HOH:O	1.56	1.03
1:D:247:MET:HE1	1:D:297:LYS:HD3	1.56	0.86
1:C:238:ASN:ND2	1:C:240:CYS:SG	2.54	0.80
2:C:601:KPG:H1	2:C:601:KPG:H6	1.62	0.79
2:A:601:KPG:H1	2:A:601:KPG:H6	1.63	0.79

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:B:860:HOH:O	6:C:1083:HOH:O[3_544]	1.86	0.34
6:B:1015:HOH:O	6:D:798:HOH:O[1_655]	1.87	0.33
6:A:1060:HOH:O	6:C:921:HOH:O[2_454]	2.06	0.14

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	508/516 (98%)	496 (98%)	12 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	500/516 (97%)	491 (98%)	8 (2%)	1 (0%)	44	31
1	C	501/516 (97%)	492 (98%)	9 (2%)	0	100	100
1	D	502/516 (97%)	496 (99%)	6 (1%)	0	100	100
All	All	2011/2064 (97%)	1975 (98%)	35 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	306	ASP

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	439/443 (99%)	432 (98%)	7 (2%)	58	50
1	B	434/443 (98%)	426 (98%)	8 (2%)	54	45
1	C	436/443 (98%)	427 (98%)	9 (2%)	48	38
1	D	435/443 (98%)	425 (98%)	10 (2%)	45	34
All	All	1744/1772 (98%)	1710 (98%)	34 (2%)	52	43

5 of 34 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	321	PHE
1	D	396	LYS
1	D	452	LYS
1	B	350	GLN
1	B	321	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	444	GLN
1	C	52	ASN
1	D	379	HIS
1	C	238	ASN
1	B	33	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 38 ligands modelled in this entry, 4 are monoatomic - leaving 34 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
4	EDO	D	607	-	3,3,3	0.23	0	2,2,2	0.32	0
2	KPG	B	601	-	15,16,16	1.47	4 (26%)	15,23,23	2.56	4 (26%)
4	EDO	B	613	-	3,3,3	0.44	0	2,2,2	0.51	0
4	EDO	B	612	-	3,3,3	0.58	0	2,2,2	0.24	0
2	KPG	C	601	-	15,16,16	1.70	1 (6%)	15,23,23	1.70	3 (20%)
4	EDO	B	604	-	3,3,3	0.33	0	2,2,2	0.31	0
4	EDO	A	605	-	3,3,3	0.50	0	2,2,2	0.24	0
4	EDO	C	607	-	3,3,3	0.62	0	2,2,2	0.37	0
4	EDO	B	608	-	3,3,3	0.33	0	2,2,2	0.48	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	EDO	B	610	-	3,3,3	0.72	0	2,2,2	0.17	0
4	EDO	B	609	-	3,3,3	0.22	0	2,2,2	0.50	0
2	KPG	D	601	-	15,16,16	1.09	1 (6%)	15,23,23	3.42	4 (26%)
4	EDO	B	603	-	3,3,3	0.11	0	2,2,2	0.13	0
4	EDO	D	608	-	3,3,3	0.11	0	2,2,2	0.22	0
4	EDO	C	603	-	3,3,3	0.63	0	2,2,2	0.46	0
3	NAI	B	602	5	42,48,48	0.91	2 (4%)	47,73,73	0.84	1 (2%)
4	EDO	B	605	-	3,3,3	1.31	0	2,2,2	0.56	0
4	EDO	B	606	-	3,3,3	0.23	0	2,2,2	0.85	0
4	EDO	D	605	-	3,3,3	0.45	0	2,2,2	0.69	0
2	KPG	A	601	-	15,16,16	1.40	3 (20%)	15,23,23	2.09	4 (26%)
4	EDO	D	604	-	3,3,3	0.66	0	2,2,2	0.94	0
3	NAI	D	602	5	42,48,48	0.89	2 (4%)	47,73,73	0.89	1 (2%)
4	EDO	C	606	-	3,3,3	0.59	0	2,2,2	1.19	0
3	NAI	A	602	5	42,48,48	0.80	0	47,73,73	1.02	4 (8%)
4	EDO	C	604	-	3,3,3	0.69	0	2,2,2	0.07	0
4	EDO	B	611	-	3,3,3	0.22	0	2,2,2	0.32	0
4	EDO	D	606	-	3,3,3	0.51	0	2,2,2	0.53	0
4	EDO	A	603	-	3,3,3	0.65	0	2,2,2	0.29	0
4	EDO	A	606	-	3,3,3	0.51	0	2,2,2	0.92	0
4	EDO	A	604	-	3,3,3	0.36	0	2,2,2	0.64	0
4	EDO	D	603	-	3,3,3	0.54	0	2,2,2	0.74	0
4	EDO	C	605	-	3,3,3	0.54	0	2,2,2	0.57	0
3	NAI	C	602	5	42,48,48	0.83	1 (2%)	47,73,73	1.10	3 (6%)
4	EDO	B	607	-	3,3,3	0.25	0	2,2,2	0.45	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EDO	D	607	-	-	0/1/1/1	-
2	KPG	B	601	-	-	5/22/22/22	-
4	EDO	B	613	-	-	0/1/1/1	-
4	EDO	B	612	-	-	0/1/1/1	-
2	KPG	C	601	-	-	8/22/22/22	-
4	EDO	B	604	-	-	0/1/1/1	-
4	EDO	A	605	-	-	0/1/1/1	-
4	EDO	C	607	-	-	0/1/1/1	-
4	EDO	B	608	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EDO	B	610	-	-	0/1/1/1	-
4	EDO	B	609	-	-	0/1/1/1	-
2	KPG	D	601	-	-	6/22/22/22	-
4	EDO	B	603	-	-	0/1/1/1	-
4	EDO	D	608	-	-	1/1/1/1	-
4	EDO	C	603	-	-	0/1/1/1	-
3	NAI	B	602	5	-	2/25/72/72	0/5/5/5
4	EDO	B	605	-	-	1/1/1/1	-
4	EDO	B	606	-	-	0/1/1/1	-
4	EDO	D	605	-	-	1/1/1/1	-
2	KPG	A	601	-	-	8/22/22/22	-
4	EDO	D	604	-	-	0/1/1/1	-
3	NAI	D	602	5	-	3/25/72/72	0/5/5/5
4	EDO	C	606	-	-	1/1/1/1	-
3	NAI	A	602	5	-	2/25/72/72	0/5/5/5
4	EDO	C	604	-	-	0/1/1/1	-
4	EDO	B	611	-	-	0/1/1/1	-
4	EDO	D	606	-	-	0/1/1/1	-
4	EDO	A	603	-	-	0/1/1/1	-
4	EDO	A	606	-	-	0/1/1/1	-
4	EDO	A	604	-	-	1/1/1/1	-
4	EDO	D	603	-	-	0/1/1/1	-
4	EDO	C	605	-	-	1/1/1/1	-
3	NAI	C	602	5	-	2/25/72/72	0/5/5/5
4	EDO	B	607	-	-	1/1/1/1	-

The worst 5 of 14 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	601	KPG	O6-C6	5.59	1.47	1.43
3	D	602	NAI	C4N-C3N	-3.02	1.44	1.49
2	A	601	KPG	C1-C2	-2.90	1.48	1.52
2	B	601	KPG	P-O6	2.71	1.68	1.60
2	B	601	KPG	O12-C1	-2.53	1.34	1.40

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	601	KPG	C1-C2-C3	9.33	126.28	113.19
2	D	601	KPG	O2-C2-C1	-8.21	90.41	109.47
2	B	601	KPG	C1-C2-C3	7.84	124.19	113.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	601	KPG	C1-C2-C3	-5.20	105.91	113.19
2	C	601	KPG	C1-C2-C3	-4.75	106.53	113.19

There are no chirality outliers.

5 of 43 torsion outliers are listed below:

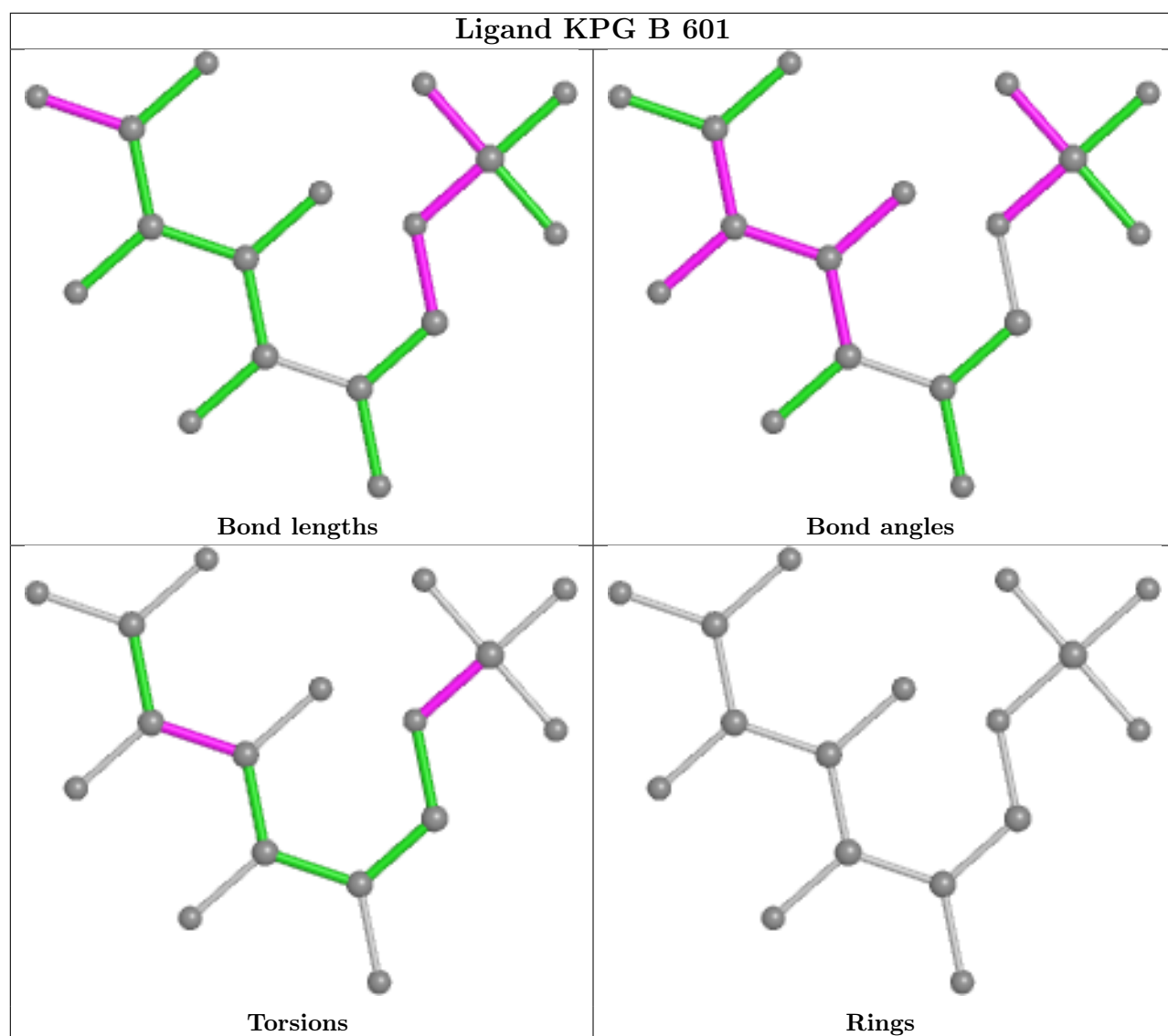
Mol	Chain	Res	Type	Atoms
2	A	601	KPG	C6-O6-P-O2P
2	A	601	KPG	C6-O6-P-O3P
2	A	601	KPG	O11-C1-C2-O2
2	A	601	KPG	O11-C1-C2-C3
2	A	601	KPG	O12-C1-C2-O2

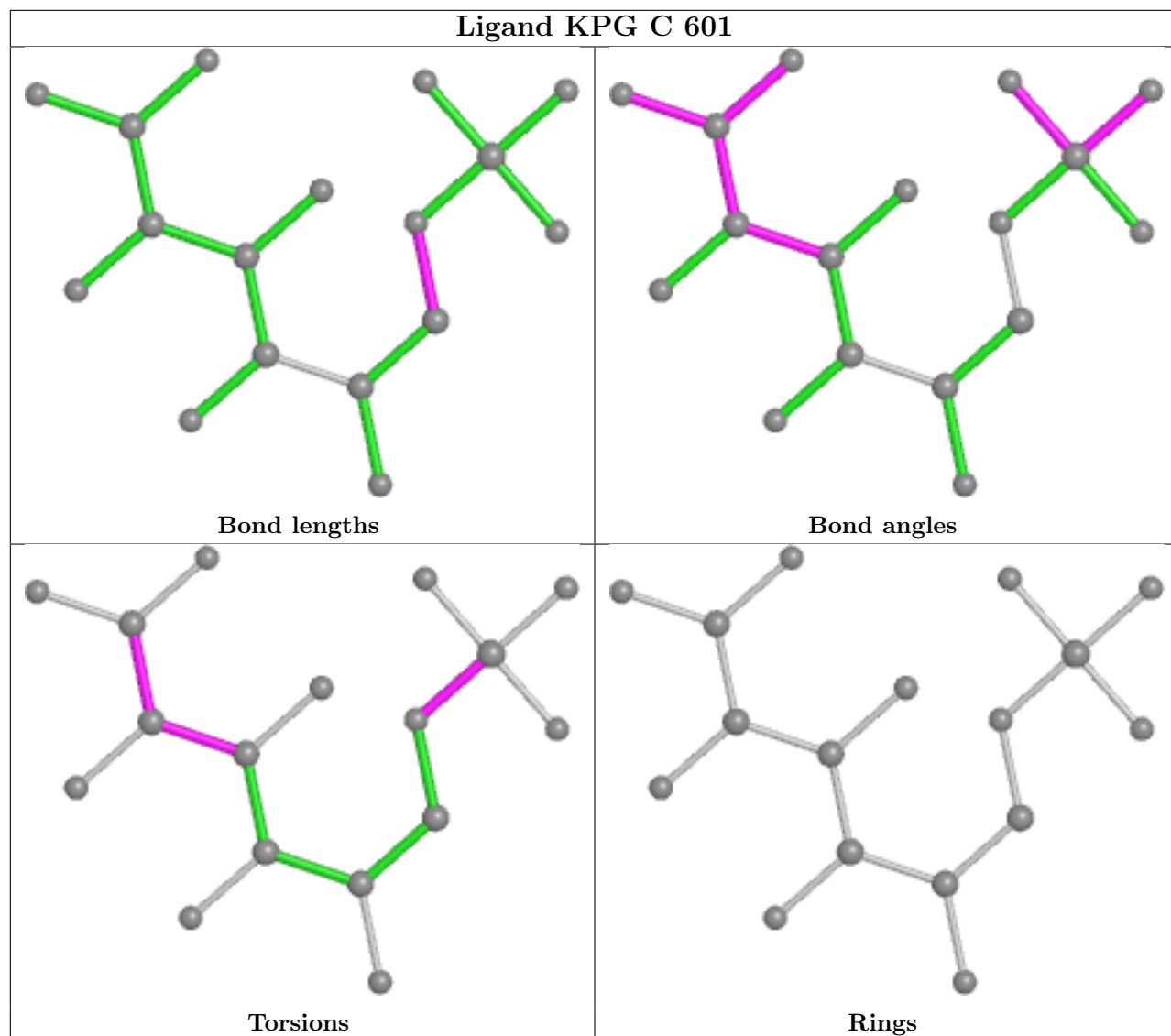
There are no ring outliers.

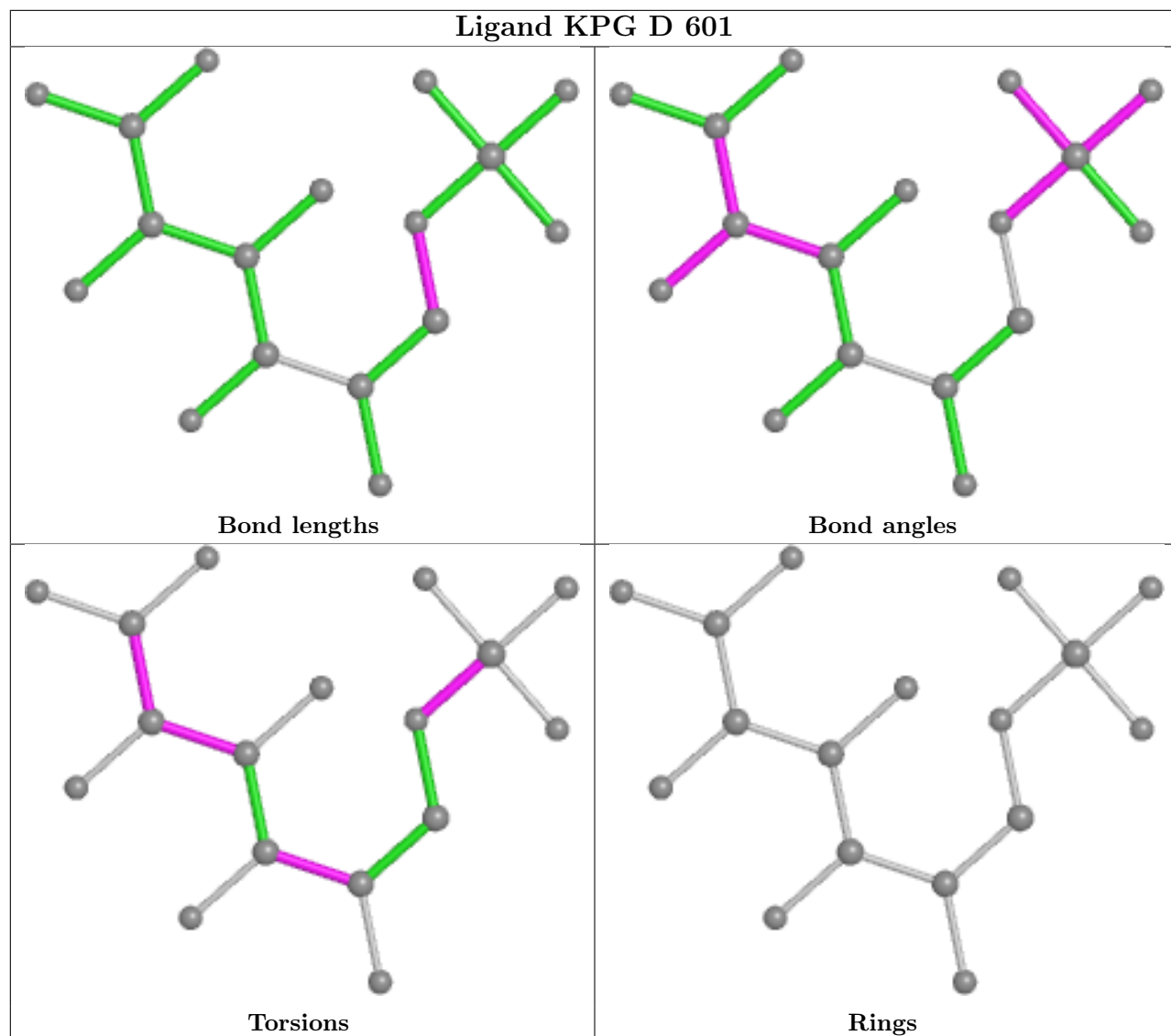
11 monomers are involved in 24 short contacts:

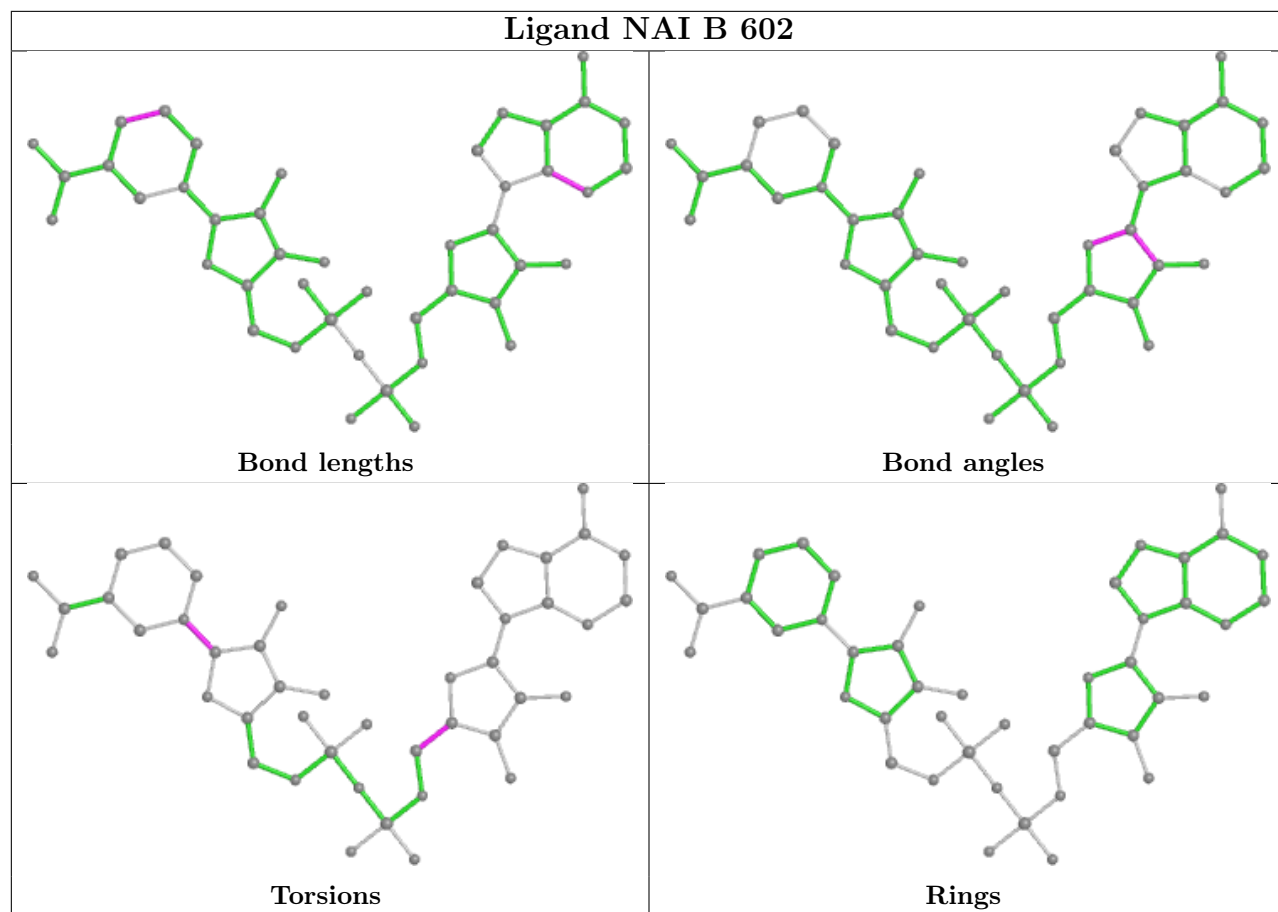
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	601	KPG	4	0
4	B	613	EDO	1	0
2	C	601	KPG	4	0
4	B	604	EDO	1	0
2	D	601	KPG	4	0
3	B	602	NAI	2	0
4	D	605	EDO	1	0
2	A	601	KPG	5	0
3	A	602	NAI	1	0
4	A	603	EDO	1	0
4	C	605	EDO	1	0

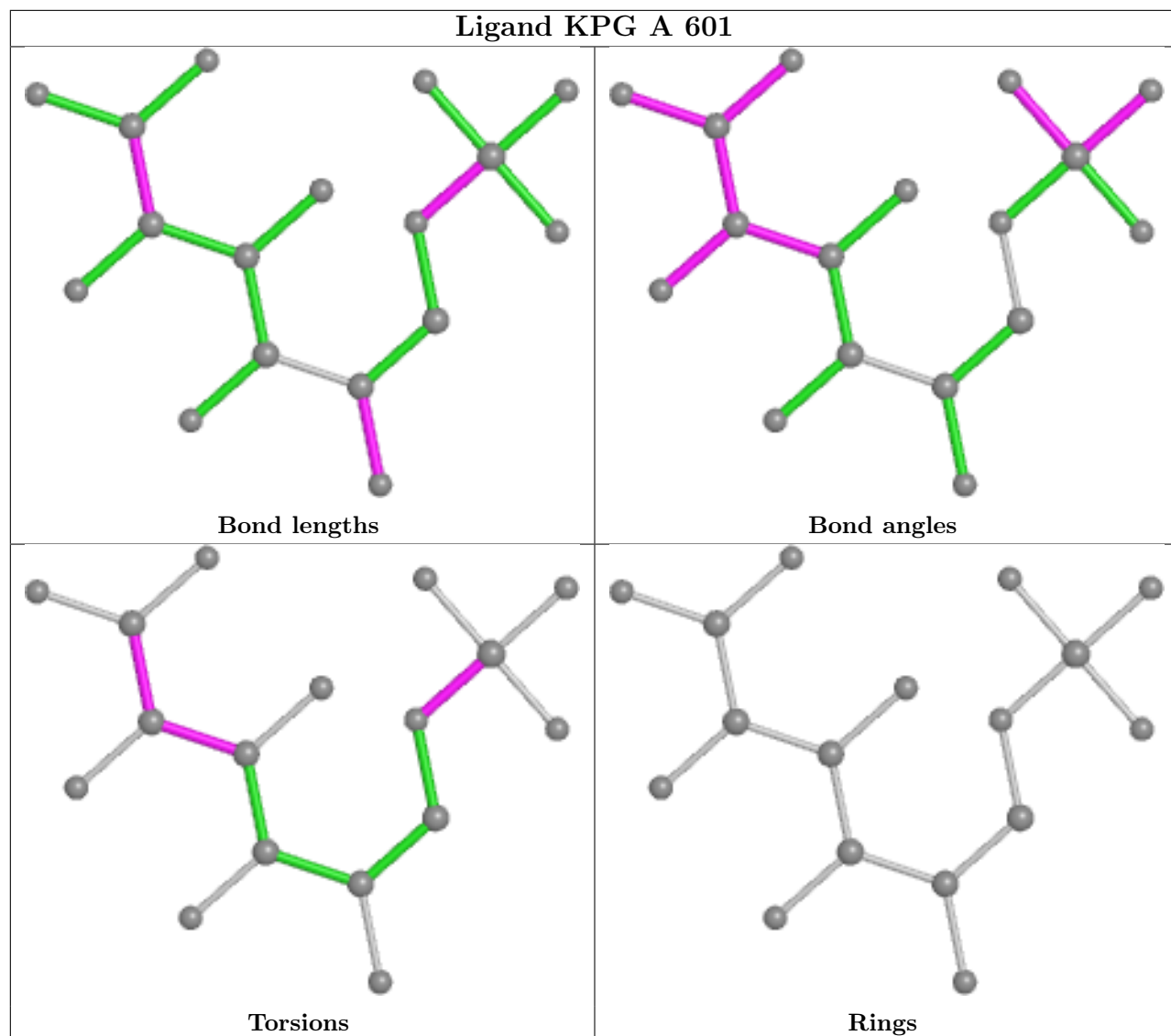
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

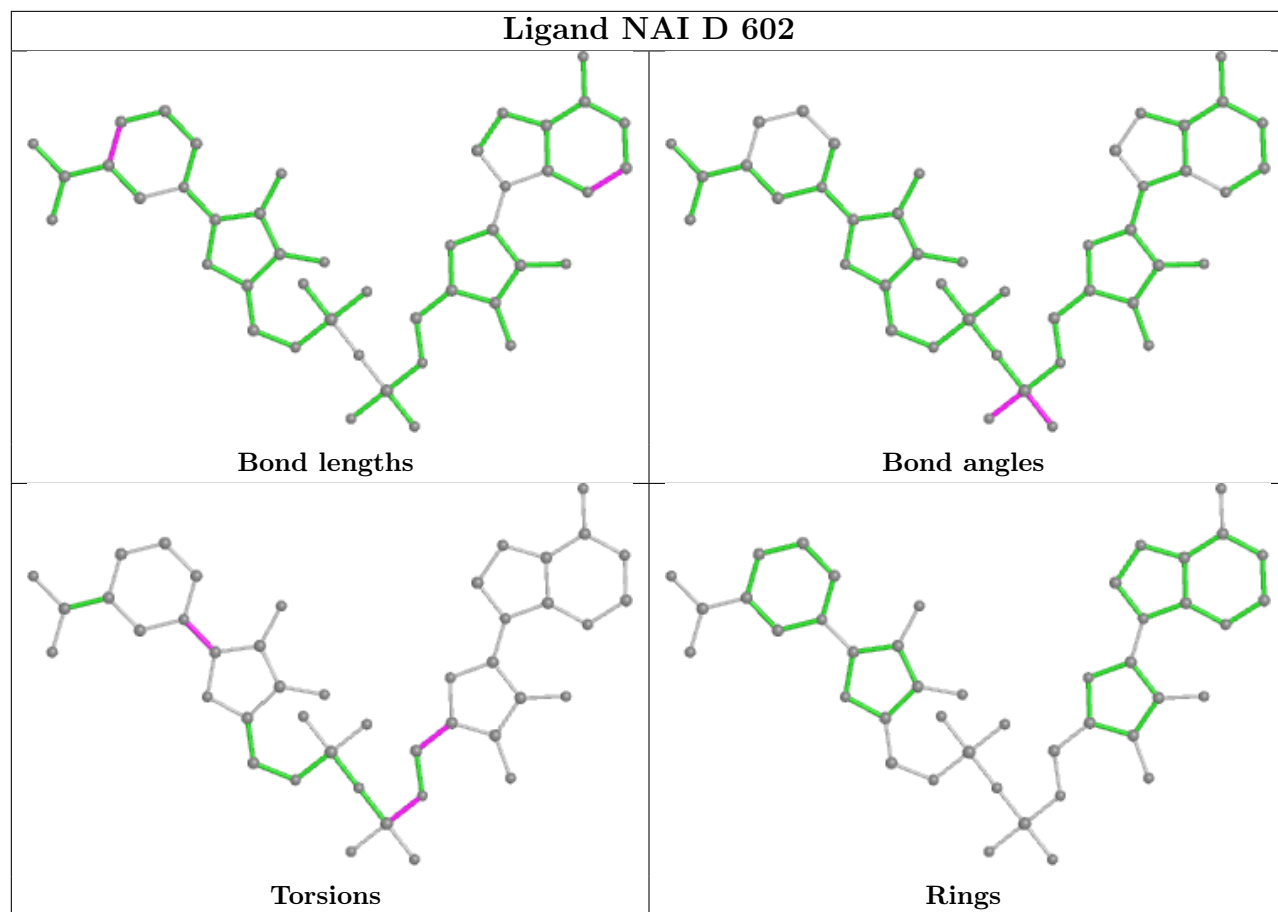


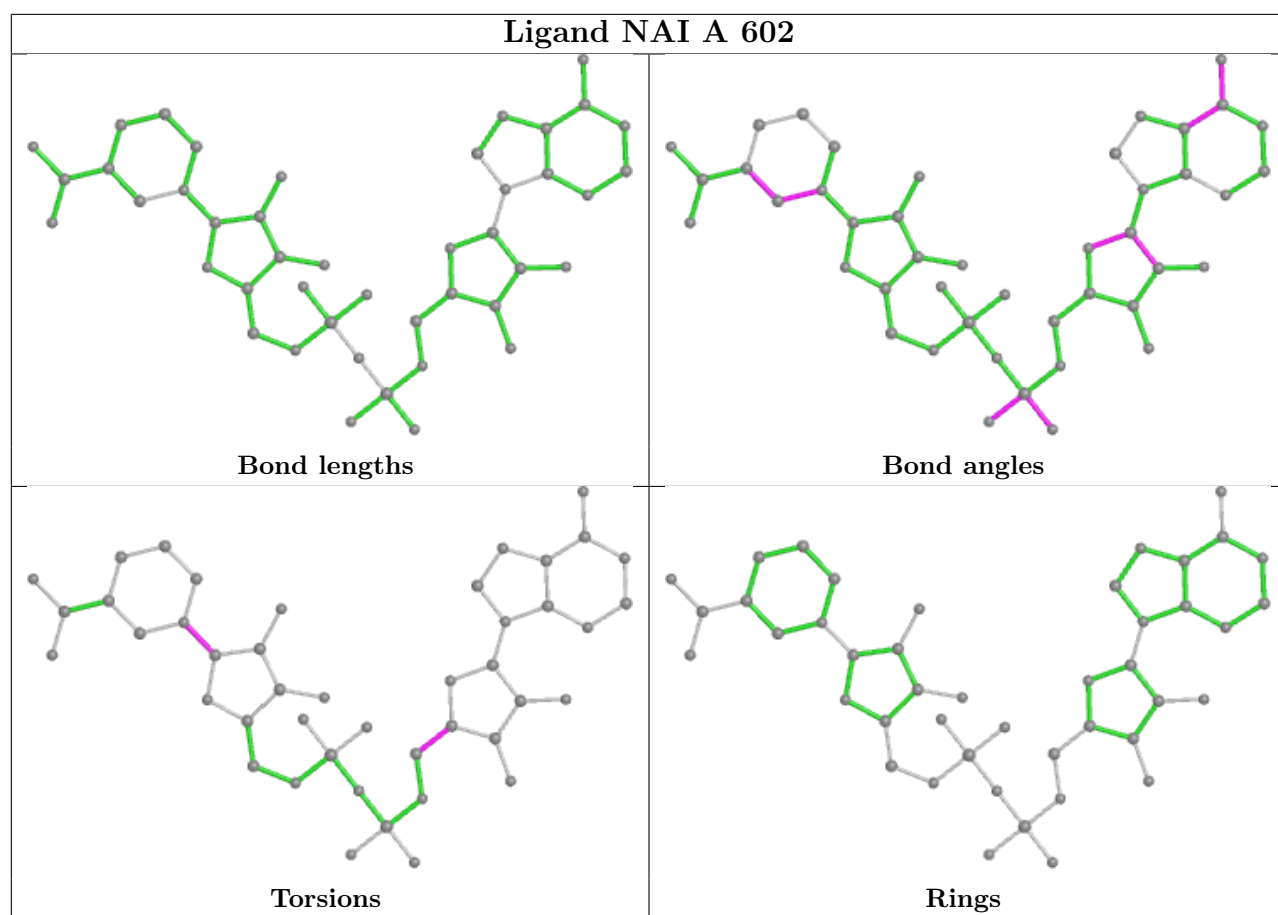


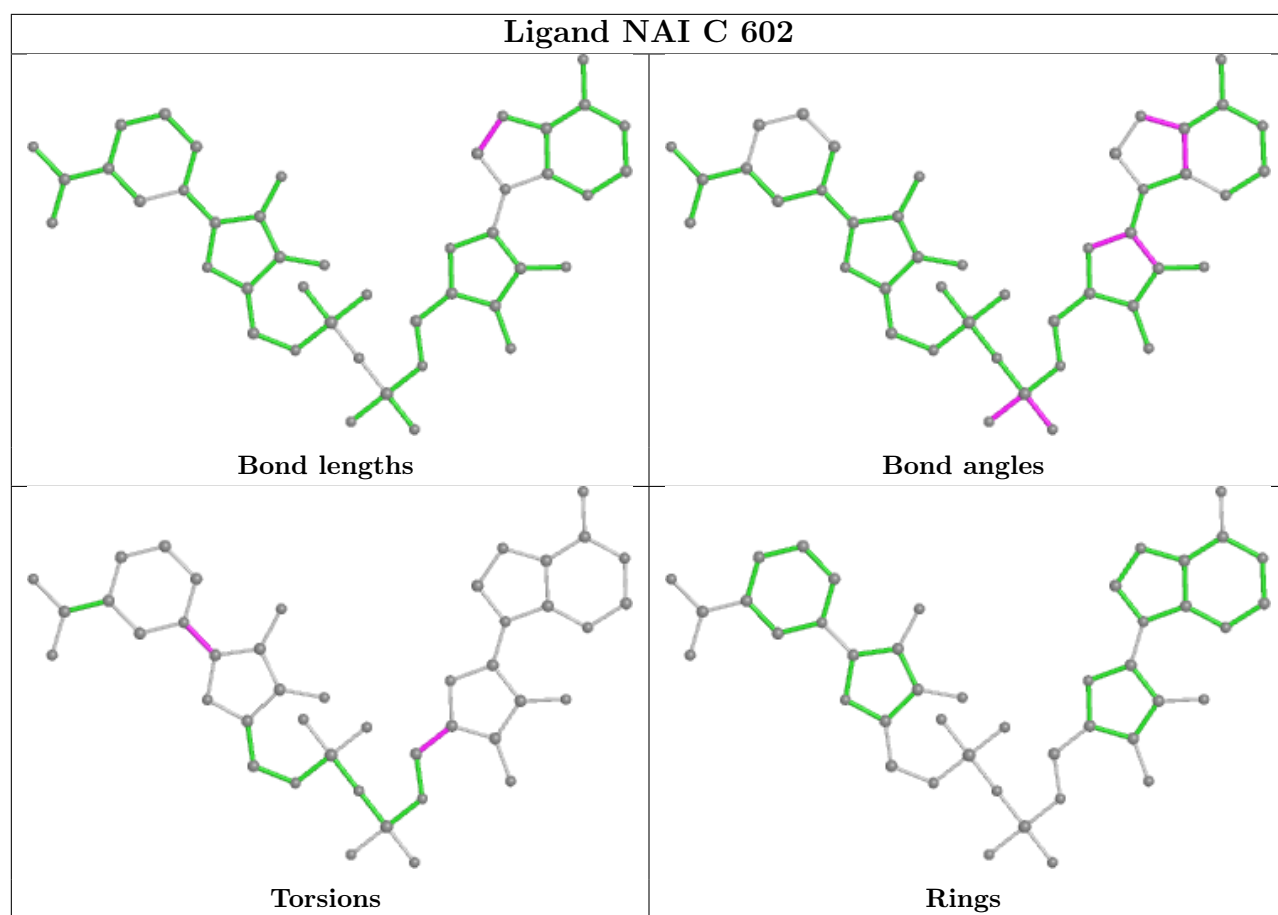












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	510/516 (98%)	-0.61	3 (0%) 85 85	6, 11, 25, 55	0
1	B	504/516 (97%)	-0.66	1 (0%) 92 91	6, 10, 25, 61	0
1	C	505/516 (97%)	-0.58	4 (0%) 82 82	7, 12, 28, 54	0
1	D	506/516 (98%)	-0.57	5 (0%) 79 78	6, 11, 29, 67	0
All	All	2025/2064 (98%)	-0.60	13 (0%) 85 85	6, 11, 28, 67	0

The worst 5 of 13 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	41(A)	ALA	7.5
1	A	1	MET	3.4
1	C	40	SER	3.3
1	A	376	LEU	2.8
1	D	41(B)	SER	2.4

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

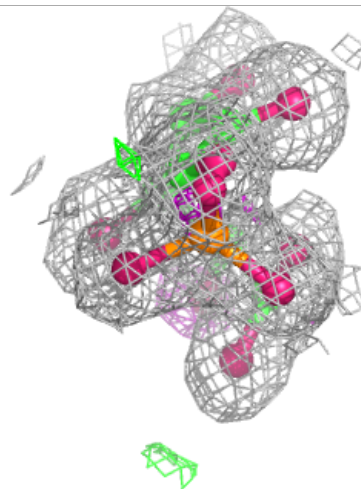
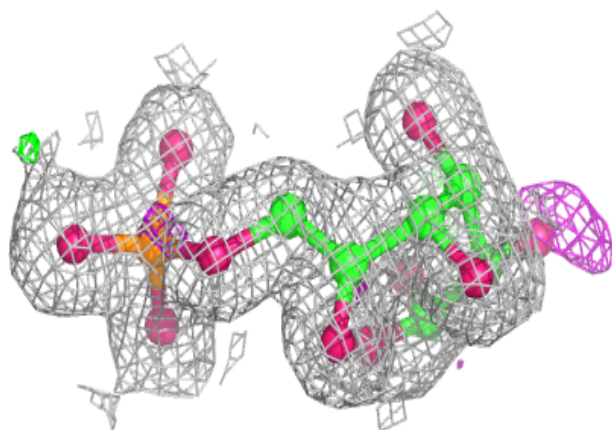
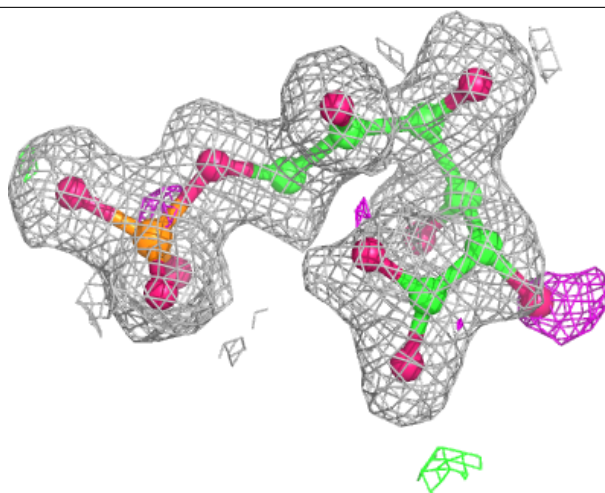
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	EDO	C	605	4/4	0.82	0.15	31,34,34,37	0
4	EDO	B	607	4/4	0.83	0.17	43,46,51,56	0
4	EDO	B	613	4/4	0.84	0.17	31,31,34,35	0
4	EDO	B	612	4/4	0.86	0.12	31,34,34,37	0
4	EDO	B	609	4/4	0.88	0.11	33,34,35,36	0
4	EDO	B	606	4/4	0.88	0.13	36,36,37,42	0
4	EDO	D	608	4/4	0.88	0.12	34,35,37,44	0
4	EDO	A	606	4/4	0.90	0.10	16,21,25,28	0
4	EDO	A	603	4/4	0.92	0.11	18,18,20,24	0
4	EDO	B	604	4/4	0.93	0.10	19,27,27,29	0
4	EDO	C	603	4/4	0.94	0.08	14,16,16,17	0
4	EDO	B	605	4/4	0.94	0.08	19,20,22,23	0
4	EDO	D	603	4/4	0.94	0.07	16,21,21,25	0
4	EDO	D	605	4/4	0.94	0.13	18,23,26,29	0
4	EDO	D	606	4/4	0.94	0.08	13,15,15,17	0
4	EDO	B	603	4/4	0.94	0.09	21,22,23,25	0
4	EDO	B	608	4/4	0.95	0.07	17,21,23,26	0
4	EDO	A	604	4/4	0.95	0.11	19,20,21,24	0
4	EDO	A	605	4/4	0.95	0.06	15,16,17,21	0
4	EDO	D	607	4/4	0.95	0.08	14,15,18,20	0
4	EDO	C	606	4/4	0.95	0.07	16,20,21,22	0
4	EDO	C	604	4/4	0.96	0.07	18,19,21,21	0
4	EDO	C	607	4/4	0.96	0.07	17,21,22,24	0
4	EDO	B	611	4/4	0.96	0.07	14,15,16,16	0
4	EDO	D	604	4/4	0.96	0.08	13,16,19,19	0
2	KPG	B	601	17/17	0.97	0.07	9,14,25,41	0
4	EDO	B	610	4/4	0.97	0.07	12,14,16,16	0
2	KPG	D	601	17/17	0.97	0.07	11,15,25,34	0
2	KPG	A	601	17/17	0.97	0.06	10,15,24,42	0
2	KPG	C	601	17/17	0.98	0.06	10,15,23,46	0
3	NAI	C	602	44/44	0.99	0.03	6,8,9,9	0
3	NAI	D	602	44/44	0.99	0.04	6,8,10,11	0
3	NAI	A	602	44/44	0.99	0.03	6,8,9,9	0
3	NAI	B	602	44/44	0.99	0.03	7,8,9,11	0
5	K	A	607	1/1	1.00	0.06	15,15,15,15	0
5	K	B	614	1/1	1.00	0.06	16,16,16,16	0
5	K	C	608	1/1	1.00	0.06	15,15,15,15	0
5	K	D	609	1/1	1.00	0.07	16,16,16,16	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

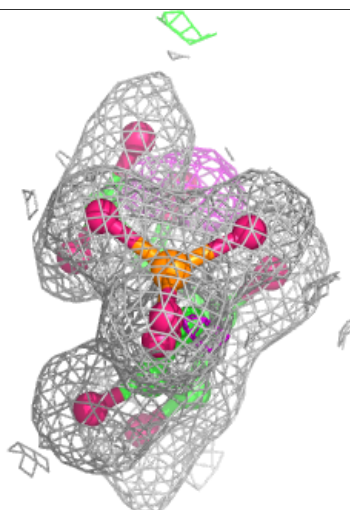
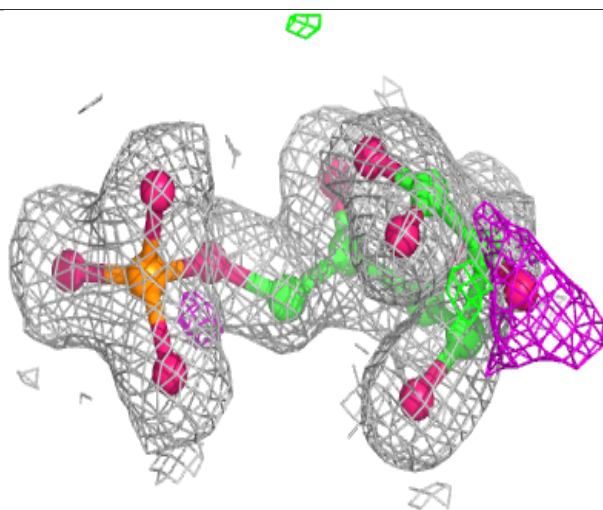
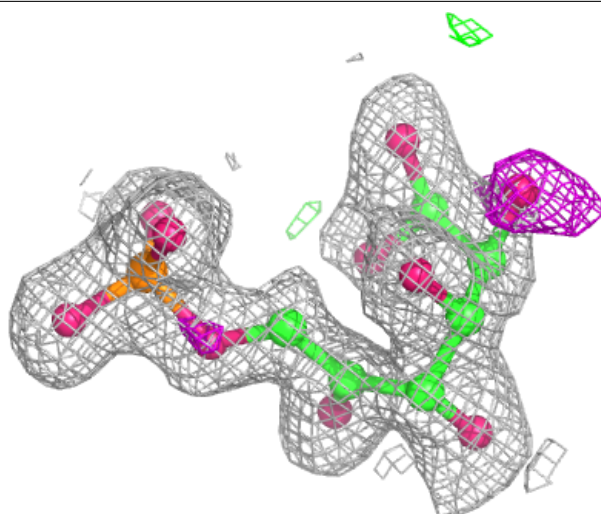
Electron density around KPG B 601:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



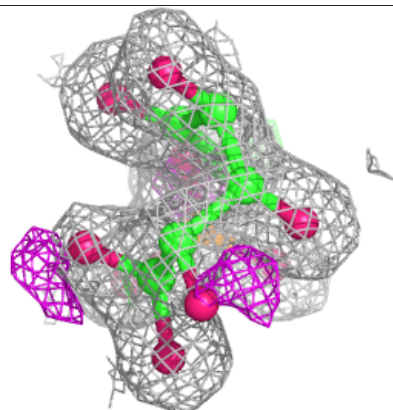
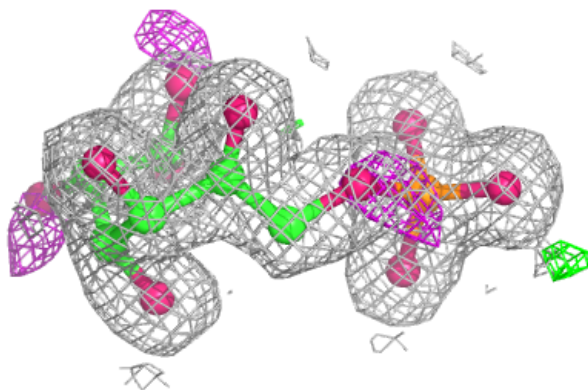
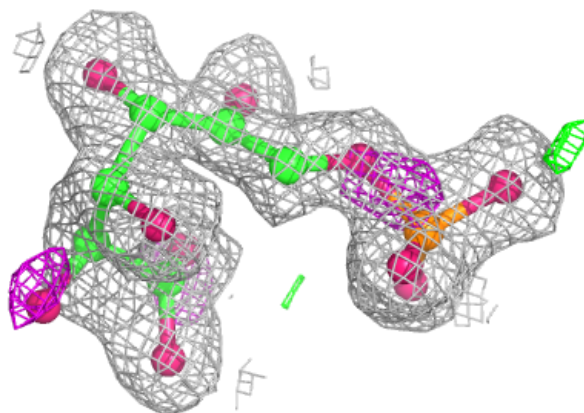
Electron density around KPG D 601:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

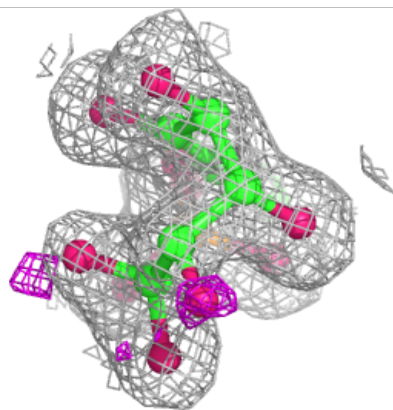
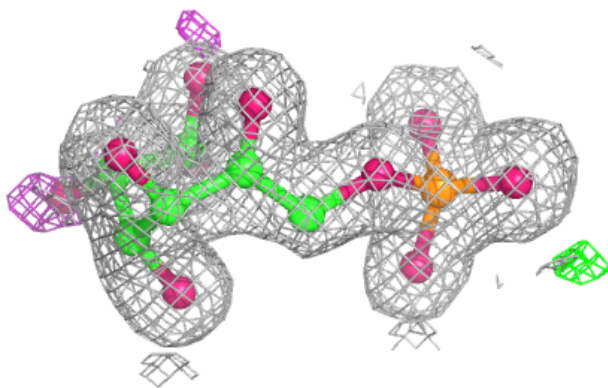
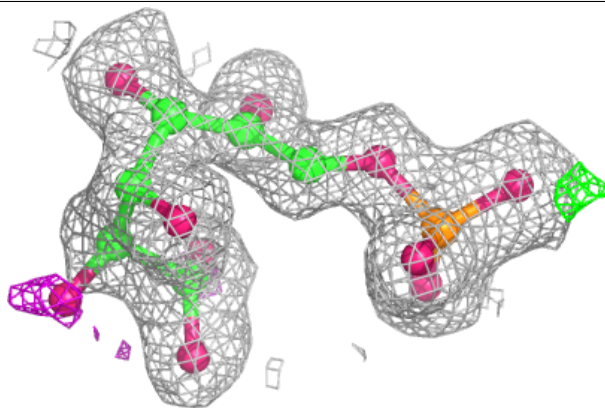


Electron density around KPG A 601:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

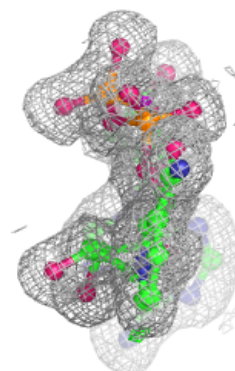
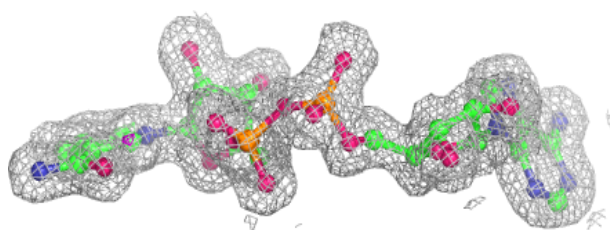
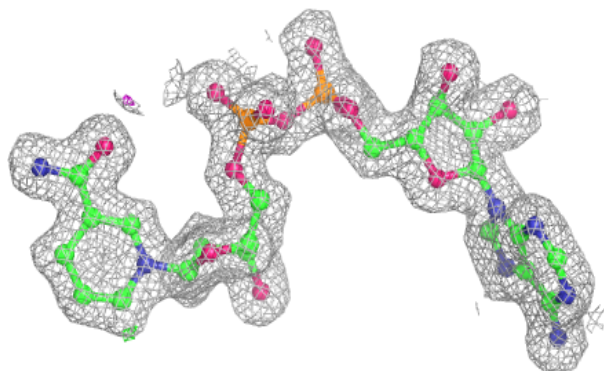
**Electron density around KPG C 601:**

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

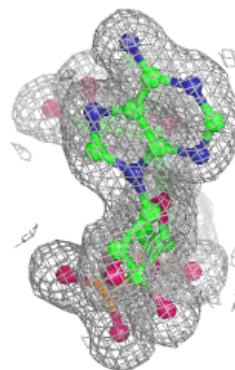
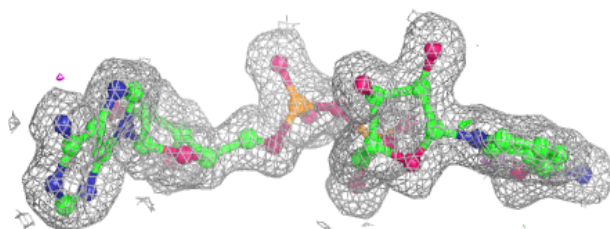
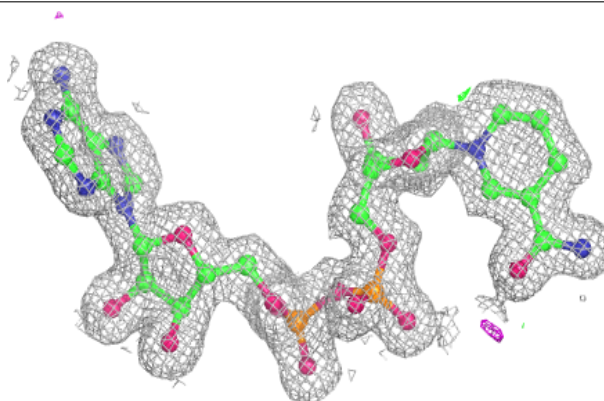


Electron density around NAI C 602:

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and green (positive)

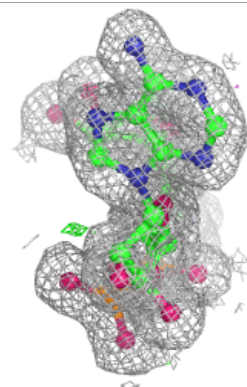
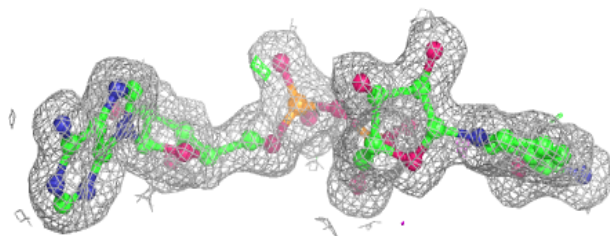
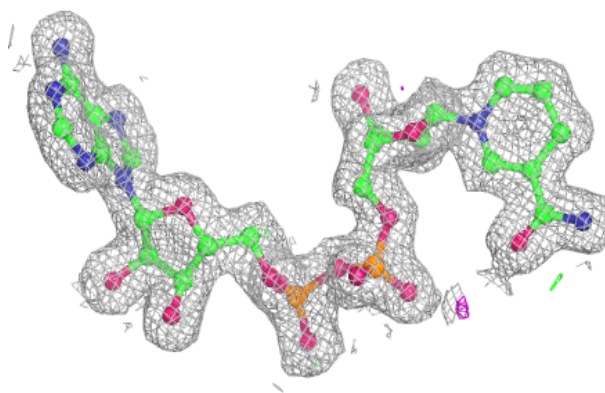
**Electron density around NAI D 602:**

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

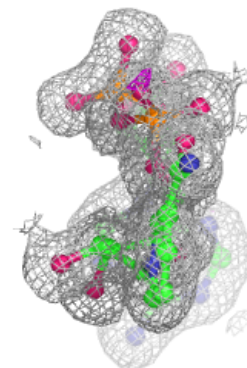
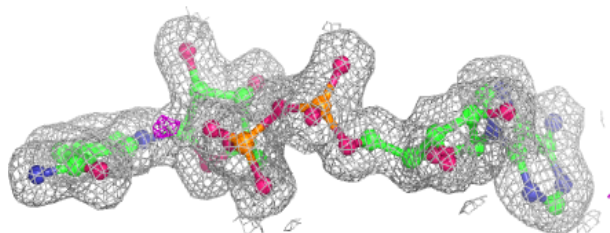
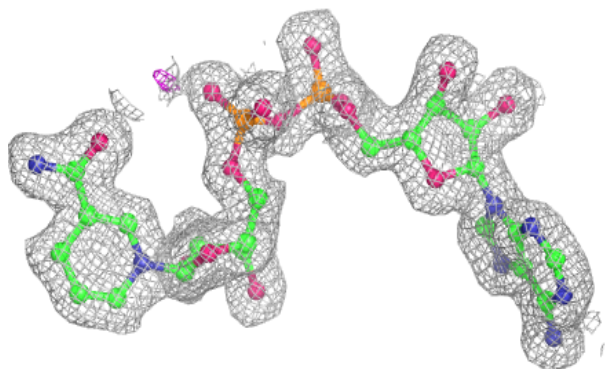


Electron density around NAI A 602:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around NAI B 602:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.